

REMARKS

Claims 1-30, as amended, are now pending. Claims 25-30 are added by this amendment. Also submitted herewith is an Information Disclosure Statement.

The present application is a continuation of U.S. Patent Application 09/930,896. An Office Action was mailed January 10, 2003 in the parent application setting forth rejections under 35 USC §§112 and 103. Dependent claims 18 and 19 were indicated to be allowable if amended to include the limitations of the claims from which they depend. New claim 28 corresponds to the invention recited in original claim 18 in combination with the limitations of original independent claim 14 from which it depended, and hence has been indicated to be allowable. New claim 29 corresponds to original claim 19, and depends from new claim 28, and therefore has also been indicated to be allowable.

The parent application was abandoned in favor of this application before addressing the rejections in the parent case, which are now fully addressed herein. It is respectfully submitted that the pending claims overcome the rejections under 35 USC §112. Further, for the reasons stated below, it is respectfully submitted that the rejections under 35 U.S.C. §103 should not be brought again in this application, and that the case is now ready for allowance.

A major objective of the present invention is to address tension variations in a metal strip during coiling and uncoiling operations. To form a coil, the end of a metal strip is inserted into a slot on a coiler drum, and the coiler then rotated to form a coil. The strip forms a bump where it projects from the slot, and this bump causes an eccentricity in the coil diameter. When, for example, the strip is connected to a second coil, and then coiled onto the second coil as it is uncoiled from the first coil, tension variations arise due to the eccentricity in the coil diameters as they rotate in a cyclical manner. The coiling and uncoiling operation can be repeated multiple times until the strip is processed to the desired dimensions or to have the desired properties. The tension variations can be very large and very difficult to adjust for in an industrial metal strip processing facility where the coils are very large and the coiling operations occur at high speeds.

The present invention involves adjusting the strip path length with a moveable roll to reduce tension variations in the strip in response to the coiler rotational angle. The rotational angle of a coiler can be measured to determine where the eccentricity on the coil is, and the position of the moveable roll adjusted in a cyclical pattern of movement matching the cyclical increase and decrease in the coil diameter due to the eccentricity. The prior art is devoid of any teaching or suggestion of using the rotational angle of the coiler to control the strip path length with a separate moveable roll. Other features of the present invention are also not taught or suggested by the prior art as recited in the dependent claims.

With regard to Griffin, U.S. Patent 4,463,586, a very different invention is taught. Griffin measures the "wrap angle of the metal strip on the shape sensing roll" by virtue of the pressure applied to the shape sensing roll (column 4, lines 23-4). The wrap angle is not a measure of the rotation of a coiler, as recited in the present claims, but rather a property measuring technique to determine metal strip shape parameters such as gauge, level, bend, flatness, etc. Griffin is not concerned with tension variations in a strip being coiled or uncoiled. With reference to column 1, lines 30-37 of Griffin, the "wrap angle is defined as the angle subtended at the center of the shape sensing roll between the two points at which the metal strip is tangent to the shape sensing roll. If the wrap angle is too small, then the metal strip will not exert enough pressure on the shape sensing roll for the sensors to detect the pressure so that the shape sensing roll will not be able to perform its control function. If the wrap angle is too large, then the metal strip will exert enough pressure to do permanent damage to the sensors of the shape sensing rolls as the sensors are relatively fragile instruments." Referring to Figure 1, of Griffin, the wrap angle is measured with respect to shape sensing roll 19, and is simply a measure of how far the strip is wrapped about shape sensing roll 19. The rotational angle of coil 100 is not measured in contrast to the present invention, and the strip of Griffin cannot be wrapped about shape sensing roll 19 multiple times to form a coil. In order to highlight this clear patentable distinction over Griffin and the prior art in general, the rotational angle of the coiler is now more definitely recited in the present claims.

Dreschau, U.S. Patent 5,176,334, does not meet the deficiencies of Griffin, and cannot be combined therewith as it functions in a completely different way that would be defeated by Griffin's method and device. Dreschau does not use the rotational angle of the coiler to control the length of the strip path to reduce tension variations. Tension is measured in Dreschau by rollers 7 and 8 mounted on arms which pass through angle sensor 5. Sensor 5 provides signals to the controller 21, which provides signals to the coiler drive 17 to vary the speed of the coiler rotation. As is explained in the introduction of the present specification, the inertia of the system makes it impractical, if not impossible with present technology, to effectively control tension by varying the speed of the coiler. By the time a signal is generated to alter the speed of the coiler and the coiler speed adjusted, the tension variation has long since changed and the new speed is not appropriate. In contrast, the present invention uses the rotational angular position of the coiler drum to determine the position of the eccentricity of the coil and consequent tension variations due to the eccentricity, and then adjusts the strip path length to accommodate for the tension variations due to the eccentricity. Griffin cannot be combined with Dreschau because Dreschau's rollers 7 and 8 operate in a different manner and serve a different purpose than Griffin's shape sensing roll 19.

In view of the forgoing it is clear that the present inventions are patentable and allowance is respectfully requested. If there are any issues that the Examiner would like to discuss prior to issuing a Notice of Allowance, please telephone the undersigned at 408-294-6750 to expedite allowance.

Respectfully submitted,

16 April 2004
Date

Daniel B. Schein
Daniel B. Schein, Ph.D., Esq.
Registration No. 33,551

Attorney for Applicants
P.O. BOX 28403
San Jose, California 95159
Tel: 408-294-6750
Fax: 408-294-6752
Email: shinelegal@aol.com